REMARKS

Status of the Claims

In the present Amendment, claim 1 has been amended to recite that the negative electrode active material comprises an amorphous carbon. Support is found, for example, in Example 1 of the present application, in particular the paragraph bridging pages 22-23 of the originally filed specification (hereinafter "the specification").

Claims 13-19 have been added. Support for claim 13 is found, for example, in originally filed claim 1. Support for claims 14 and 15 is found, for example, in the Background Art section of the specification and the Examples and Comparative Examples of the specification. Support for claims 16-19 is found, for example, on pages 14 and 22-23 of the specification.

No new matter has been added, and entry of the Amendment is requested. Upon entry of the Amendment, claims 1-19 will be pending.

The Present Claims are Patentable over the Applied References

(1) In paragraph 1, on page 2 of the Office Action, claims 1-12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanjou (US 2003/0215702) in view of Yamashita (U.S. Patent No. 6,287,720), Takeuchi (U.S. Patent No. 6,083,645) (hereinafter "Takeuchi '645"), Takeuchi (JP 2003-208895) (hereinafter "Takeuchi '895") and Shimamura (US 2003/0113621).

The presently claimed lithium ion secondary battery is patentable over the applied references.

An objective of the presently claimed invention is to make a high output lithium ion battery. Although there are two approaches, realizing high capacity and low resistance for high output, the presently claimed invention is directed to high output by low resistance.

In order to lower the resistance, the presently claimed invention is directed to the following points:

(a) an amorphous carbon is employed having an average particle size of 5 to 10 μm as a negative electrode active material;

(b) the thickness of the negative electrode excluding the current collector is 30 to 100 μm;

(c) the negative electrode active material layers is formed on both sides of the current collector;

(d) the thickness of the current collector is 10% or more of the thickness of the negative electrode excluding the current collector; and

(e) the positive electrode terminal and the negative electrode terminal respectively satisfy the formula $B/A \geq 0.57$.

In sum, the presently claimed invention not only employs amorphous carbon as a negative electrode active material, but also provides for a current path when using the amorphous carbon to achieve low resistance.

One of ordinary skill in the art in possession of the teachings of the references applied by the Examiner would not have arrived at the claimed lithium ion secondary battery.

Takeuchi '645 is directed to the achievement of high capacity, and not low resistance. Takeuchi '645 clearly requires employing a combination of crystalline carbon particles and a metal which forms an alloy with lithium. Applicants submit that one of ordinary skill in the art would have had no reason to replace the crystalline carbon of Takeuchi '645 with amorphous carbon. Further, even if, *arguendo*, one or ordinary skill in the art would have been motivated to substitute amorphous carbon for the crystalline carbon of Takeuchi '645, a larger particle size

would have been used to obtain the same performance because the specific surface area of graphite is usually larger than the specific surface area of amorphous carbon. In addition, if one of ordinary skill in the art did employ amorphous carbon having same particle size, a thicker active material layer would have been used. Therefore, Takeuchi '645 fails to provide for the above-described point (a) of the presently claimed invention.

The above statements also apply to Takeuchi '895.

Shimamura generally discloses an amorphous carbon for a negative electrode active material and further discloses that the width of the negative electrode active material layer is same as the width of a negative terminal. However, Shimamura is completely silent regarding the particle size in the above-described point of (a) of the presently claimed invention, along with all of points (b) and (d).

Yamashita generally discloses an amorphous carbon for a negative electrode active material. However, referring to the Examples of Yamashita, needle coke, which is a type of crystalline carbon, was employed as a negative active material (see column 16) and the anode active material layer had a thickness 124 μm (Example 1) or 81 μm (Example 2) on one side. Further, Yamashita does not address particle size. Therefore, Yamashita is silent regarding the above-mentioned points (a)-(e) of the presently claimed invention.

In light of the above, even if the teachings of Yamashita, Takeuchi '645, Takeuchi '895 and Shimamura were combined, one of ordinary skill in the art would have arrived at the above-described points (a)-(d).

In addition, Applicants submit that amorphous carbon is overwhelmingly cheap in comparison with crystalline carbon. Clearly, it is extremely useful to obtain superior

characteristics with cheap materials for the production of large-sized secondary batteries, and none of the prior art applied by the Examiner actually employed amorphous carbon.

Finally, Applicants would like to point out to the Examiner that originally filed claim 1 has been allowed in Japan.

In view of the above, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-12 as being unpatentable over Tanjou in view of Yamashita, Takeuchi '645, Takeuchi '895 and Shimamura.

(2) In paragraph 2, on page 7 of the Office Action, claims 1-12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanjou in view of Yamashita, Yoshida (U.S. Patent No. 6,291,102) and Shimamura.

Applicants traverse.

The presently claimed invention is patentable over Tanjou, Yamashita, Yoshida and Shimamura in view of the arguments set forth above and the additional remarks below.

Yoshida generally discloses that an amorphous carbon may be used as the negative electrode active material. However, with regard to the thicknesses of the current collector and active material layer, Mesophase Microbead Carbon was employed in Examples 1 and 4 and the Comparative Example, which is a crystalline carbon. Further, the negative active layer **7** was formed on one side of current collector **6**, as shown in FIG. 4. Therefore, Yoshida does not disclose the above-mentioned points of (b)-(d) of the presently claimed invention.

In the presently claimed invention, the thickness of the negative electrode active material layer on one side of the current collector can be half of the total thickness the layers on both side of the current collector, as described on page 14 of the present specification. That is, the thickness of the negative electrode active material layer on one side of the current collector can

be in the range of 15 to 50 μm (i.e., one half of the claimed thickness of 30 to 100 μm). This means that the current path length from the outer surface of the negative electrode active material layer to the inner surface of the layer on the current collector is very short, such that the internal resistance can be effectively reduced.

In view of the above, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-12 as being unpatentable over Tanjou in view of Yamashita, Yoshida and Shimamura.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The U.S. Patent and Trademark Office is hereby directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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